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Low-field superconducting spin switch based on a superconductor/ferromagnet multilayer

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Abstract

The principle of a novel device, called a superconducting spin switch or a spin valve for supercurrent, based on a four-layer antiferromagnet/ferromagnet/superconductor/ferromagnet spin-valve-like structure was investigated. Results show that the parallel alignment of magnetizations in the ferromagnetic layer of this structure has either zero value or lower superconducting transition temperature compared to an antiparallel alignment of magnetizations. Thus, the rotation of magnetization of the top free ferromagnetic layer by a weak external magnetic field can switch the supercurrent flowing through the superconducting layer.